SAFETY ANALYSIS REPORTS FIRE HAZARD ANALYSIS SAFE SHUTDOWN ANALYSIS AT DOE NUCLEAR FACILITIES

Charles Ramsey, EH-53

REGULATORY REQUIREMENT

- 10 CFR 830, Subpart B - A documented Safety Analysis must address all hazards (radiological and non-radiological) and the controls necessary to provide adequate protection, including physical, design, structural, and engineering features; safety structures, systems and components; safety management programs, etc.

REGULATORY REQUIREMENT

- DOE Order 420.1 provides DOE's expectations with respect to fire protection. Contractors should consider fire protection as necessary for safe operation of a DOE nuclear facility and identify safety structures, systems, and components required to be protected from fire damage in the documented safety analysis.

REGULATORY REQUIREMENT

- 10 CFR 830, Nuclear Safety Management
- Subpart A, Quality Assurance (10CFR830.120)
- Subpart B, Safety Basis Requirements
- 830.202, Safety Basis
- 830.203, Unreviewed Safety Question
- 830.204, Documented Safety Analysis-SAR
- 830.205, Technical Safety Requirements

REGULATORY REQUIREMENT

- 10 CFR 830.207, DOE Approval of Safety Basis - DOE will review each documented safety analysis to determine whether the rigor and detail of the analysis are appropriate for the complexity and hazards expected at the nuclear facility, and issue a Safety Evaluation Report (SER) documenting the results of its review.

REGULATORY REQUIREMENT

- April 9, 2001 - DOE must be notified if Safety Basis requirement is met and reflects the current work and hazards associated with a facility so that SER can be issued.
- April 10, 2001, Final Rule effective
- October 10, 2001, If DOE has not issued SER, contractor must submit Safety Basis to DOE by April 10, 2003

REGULATORY REQUIREMENT

- October 10, 2000, If Safety Basis is not consistent with Part 830 requirements, contractor must notify DOE. Work must continue to be performed in accordance with existing Safety Basis, consistent with Part 830 requirements
- April 10, 2003, New Safety Basis must be submitted to DOE for approval

REGULATORY REQUIREMENT

- 10 CFR 830.204(b)(5) - Documented Safety Analysis (SAR) must define the characteristics of safety management programs necessary to ensure the safe operation of the facility.

DOE ORDER REQUIREMENT

- DOE O 420.1(4.2) - FHA for all nuclear facilities, significant new facilities and facilities that represent unique or significant fire safety risks. The conclusions of the FHA shall be incorporated into the SAR and shall be integrated into design basis and beyond design basis accident conditions

DOE ORDER REQUIREMENT

- DOE O 420.1 (4.2) FHA aims to minimize the potential for:
- Fire occurrence or related event
- Onsite or Offsite release
- DOE Program interruption
- Property loss
- Process controls or SSC damage

DOE ORDER REQUIREMENT IMPLEMENTING GUIDANCE

- November 7, 1991 - Guidance on the Performance of FHAs
- FHA Purpose - Comprehensively and ***Qualitatively*** assess fire risks
- Inventory all SSCs which must function during and after a fire to assure safe shutdown and identify failure modes
- Consider spurious operation, combustion effects, firefighting effects, etc

DOE ORDER REQUIREMENT IMPLEMENTING GUIDANCE

- Implementing Guide for use with DOE Orders 420.1 and 440.1, Fire Safety Program, Section 4.0, Fire Hazard Analysis (http:tis.eh.doe.gov/fire/guidelines.html)
  - Model FHAs in Fire Protection Resource Manual
  - FHA Content
  - Safe Shutdown
  - Radiological Dispersal Potential

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- Role of Fire Protection in Overall Safety Approach
- Safety Analysis and Fire Hazard Analysis
- Fire and Explosion Are The Two Most Energetic Means By Which Radioactive/Hazardous Material(s) Can Be Dispersed To The Environment
- Fire Protection Features Relied On In The SAR To Maintain Authorization Basis

GENERAL FHA GUIDANCE

- NFPA 801
- DOE/NE-0113(REV.1), United States Department of Energy Reactor Core Protection Evaluation Methodology for Fires at RBMK and VVER Nuclear Power Plants
- IAEA Safety Report Series No. 8, Preparation of Fire Hazard Analyses for Nuclear Power Plants

GENERAL FHA GUIDANCE

- IAEA Safety Report Series No. 10, Treatment of Internal Fires in Probabilistic Safety Assessment for Nuclear Power Plants
- IAEA TECDOC-1014, Upgrading Fire Safety in Nuclear Power Plants

FHA FORMAT/CONTENT

- Implementation Guide For Use With DOE Orders 420.1 and 440.1
- Defense-In-Depth
- Fire Containment Approach
- Fire Influence Approach
- Subdivision of Buildings Into Fire Compartment/Cell - Areas/Zones

FHA FORMAT/CONTENT DATA COLLECTION

- Inventory of Safety Systems
- Inventory of Fire Compartments/Areas
- Inventory of Combustible Materials
- Inventory of Potential Ignition Sources
- Passive Fire Protection Features
- Fire Detection and Alarm Systems
- Manual/Auto Fire Extinguishing Systems
- Communications And Emergency Lighting

FHA FORMAT/CONTENT DATA COLLECTION (CNT'D)

- Analysis of Fire Growth
- Physical and Chemical Properties of Combustible Materials
- Physical Characteristics of Fire Compartments/Areas
- Postulated Internal/External Fires For Each Compartment, Including Wildland Fire Effects

FHA FORMAT/CONTENT CONSEQUENCE ANALYSIS

- Determine Fire Protection Adequacy
- Determine Fire Effects
- Determine Direct, Indirect and Secondary Fire Effects
- Determine Other Effects Outside the Compartment/Fire Area
- Evaluate The Adequacy of Fire Safety
- Evaluate Repetition Of Analysis